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MINISTRY OF
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FOOD STANDARDS COMMITTEE REPORT ON JAMS AND OTHER PRESERVES

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FOOD STANDARDS COMMITTEE

The terms of reference of the Food Standards Committee are:

To advise the Secretary of State for Scotland, the Minister of Agriculture, Fisheries and Food, the Minister of Health and, as respects Northern Ireland, the Secretary of State for the Home Department, on the composition, description, labelling and advertising of food with particular reference to the exercise of powers conferred on Ministers by Sections 4, 5 and 7 of the Food and Drugs Act, 1955, and the corresponding provisions in enactments relating to Scotland and Northern Ireland.

The members of the Food Standards Committee at the time of the completion of this report were:

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FOOD STANDARDS COMMITTEE
REPORT ON JAMS AND OTHER PRESERVES

Terms of Reference

1. We were asked to review the Food Standards (Preserves) Order, 1953, as amended, to make recommendations for any necessary amendment and to consider in particular the following questions:

(a) whether lactic acid should be added to the list of permitted acids;
(b) whether the soluble solids content should be varied for melon jam;
(c) whether the minimum fruit content of raspberry jam should be increased from 30% to 35%; and
(d) whether all fruit curds should be required to contain minimum quantities of orange or lemon oil.

The Basis of the Present Standards

2. Jams and preserves are at present controlled by the Food Standards (Preserves) Order 1953, as amended, which lays down standards of composition for jam, marmalade (including ginger marmalade), fruit curd and mincemeat. The amended Order is reproduced at Appendix II.

3. The Order was the result of a report on jams and marmalade by the Committee which was completed in 1952. The preserves industry had suggested in evidence two sets of minimum fruit contents: short term proposals with the economic and supply conditions of 1952 in mind and long term proposals for introduction as and when conditions permitted. The long term proposals were near to the full fruit and fresh fruit standards which were agreed in 1930 between the manufacturers and the Society of Public Analysts (now the Association of Public Analysts). Before 1939, most jams were made to this standard, but other second-quality jams were made with a minimum fruit content of 20%. The Committee then said in its report that it was firmly convinced that in the long term, the minimum fruit content should approximate closely to the pre-war full fruit and fresh fruit standards. The Committee recognised, however, that these could not be fully achieved immediately and confined itself to recommending most of the short term proposals with higher figures for certain jams. These recommmendations were implemented in the 1953 Order.

4. The various figures from the 1952 Report and the 1953 Order (as amended) are given in the table overleaf.

Nomenclature

5. The existing Order uses the name 'preserves' in the title, and this term is often used as a generic term to cover all products made from fruit and sugar in proportions conforming to the standard. Most of these products, except those made from citrus fruits, are described as 'jam' although where appropriate the term 'jelly' or 'jelly jam' is used. A few are described on the label as 'conserve' or as 'preserve'. Conserve is sometimes used to denote a speciality product of a higher quality, but in general there is no distinction between the three terms. The description 'marmalade' is normally used in the United Kingdom to designate a citrus preserve. Where it is used unqualified it denotes a preserve made wholly or mainly from bitter oranges with sometimes small quantities of other citrus fruit. Marmalades made with citrus fruit other than oranges are usually described by the name or names of the fruit. Ginger marmalade consists of drained ginger and citrus fruit in accordance with the standard. Products of the marmalade type from which all or most of the insoluble solids have been removed are known as 'jelly marmalade'.

Minimum Fruit Content† in lb. per 100 lb. of Jam

	Pre-War Full Fruit Standard	*Short-Term Standard*	*Long-Term Standard*	*Committee Recommendations and 1953 Order*
Bramble	38	38	38	38
Blackcurrant	30	22	25	25
Cherry	45	40	40	—
Damson	38	35	35	35
Fig and Lemon	—	—	—	40(8)*
Gooseberry	35	30	35	30
Gooseberry and Raspberry	—	30	35	30
Gooseberry and Strawberry	—	30	35	30
Greengage	40	38	38	38
Loganberry	38	25	30	30
Melon and Lemon	—	—	—	40(8)*
Melon and Pineapple	—	—	—	40(5)*
Melon and Ginger	—	—	—	40(1)*
Raspberry	38	25	30	30
Raspberry and Gooseberry	40	30	35	30
Raspberry and Loganberry	—	25	30	30
Raspberry and Redcurrant	40	30	35	30
Redcurrant	35	35	35	35
Rhubarb	45	40	40	—
Rhubarb and Ginger	—	—	—	40(1)*
Strawberry	42	37½	42	38
Strawberry and Gooseberry	—	—	—	35
Youngberry	—	38	38	38
All other varieties	40	40	40	40
Marmalade	—	—	—	20
Ginger Marmalade	—	—	—	25 drained ginger or 25 ginger and citrus with drained ginger not less than 15.

† Fruit content is the number of pounds of prepared fruit required to be used in making 100 lb. of finished jam or marmalade.

* Figures in brackets denote the proportion of the second named fruit.

The United Kingdom Preserves Industry

6. In our present review we were told in evidence by the manufacturers that the British preserves industry is the largest in the world, and that consumption in the United Kingdom is also the highest per head of population. Production had remained static at the level of about 210,000 tons per year for the past ten years. Of this total production 70,000 tons were marmalade, and 10,000 tons fruit curd. Raspberry, strawberry and blackcurrant jams, each with close to 20,000 tons, account for about half the jam produced. About 5,000 tons of jams and 5,000 tons of marmalade were exported each year, mainly to North America and to the continent of Europe. Three large firms were responsible for about 70% of the total production, and the remainder was shared between about 60 small firms. The consumption per head per week in the United Kingdom was about 1·65 oz. (46·8 g.) of jams and 1·03 oz. (29·2 g.) of marmalade. This may be compared with an inclusive consumption of about 0·92 oz. (26·1 g.) per head per week in the E.E.C. countries. Production and consumption in the United Kingdom have not increased during the past ten years, but the

manufacturers told us that they were reasonably satisfied with the present position in view of the competition from many other breakfast and tea foods.

Jam Technology

7. The commercial process of jam making begins with the preparation of selected fruit by removing unwanted material, i.e. stalks and calices, and by cleaning. Some fruits, e.g. blackcurrants, plums, are then pre-cooked with a little water until the skins and flesh are tender. At this stage, stone fruits may be sieved to remove the stones; for some other fruit, a proportion of the seeds and skins is also removed by sieving. When jellies are being made, insoluble material is removed by filtration. The prepared fresh or pre-cooked fruit is either made directly into jam, or preserved by the addition of sulphur dioxide, or by canning or freezing, in order to ensure that a supply of fruit is available throughout the rest of the year. Such preserved supplies are often purchased by the manufacturer either from home or foreign sources.

8. The prepared fruit is boiled with sugar until the sugar has diffused into the solid fruit pieces and the product is such that it will set to a jelly-like consistence on cooling. Any moulds or yeasts are destroyed during this operation. The acidity of the jam is such that there are no bacteriological hazards. The consistence of jams depends on the proportions of sugar, water, pectin and acid present at the end of the cooking period. By a suitable adjustment of these components, any required consistence can usually be obtained. Since certain fruits, e.g. strawberries, are often deficient in pectin and acid, these may require to be added during the boiling process. Conversely other fruits may be too acid, in which case partial neutralization by alkali may be necessary. Artificial colouring matter may also be added to ensure that the jam is of an attractive and consistent colour and occasionally flavouring agents are added. When fruit preserved with sulphur dioxide (sulphited pulp) is used, the preservative is almost entirely driven off (as a gas) during the boiling period. A maximum residue of 100 parts per million is permitted by the Preservatives in Food Regulations, 1962.

9. The flavour, quality and characteristics of jams are affected to a marked extent by the time and temperature of the boiling process, during which volatile fruit flavours are continuously driven off and the sugars undergo a progressive process of caramelisation. These two aspects of the boiling process are undesirable in excess as they would then result in jams deficient in the fresh fruit flavour and with a caramelised or over-cooked taste. The aim of modern processes is therefore to reduce the boiling time to a minimum in order to ensure a maximum retention of the fresh fruit flavour and a minimum of caramelisation. Over-cooking also causes darkening of the jam and the disintegration of whole fruit which it is desirable to retain intact in some jams. The technique of vacuum-boiling reduces certain effects of overcooking.

10. If all the added sugar were left unchanged at the end of the boiling, some would crystallise out in the finished jam during storage. Conversely, if too much hydrolysis of the sugar took place, producing invert sugar (dextrose + fructose), dextrose would crystallise out. A balance between sucrose and invert sugar has therefore to be reached in a jam if crystallisation is to be avoided. Normally about 20% – 35% of the added sugar needs to be 'inverted' to achieve this balance. The modern tendency to reduce cooking times to a minimum, in order to retain maximum fruit flavour, makes this degree of inversion difficult to achieve, and therefore a proportion of the sucrose is often replaced by direct addition of invert sugar.

11. When the boiling process is complete, the temperature of the jam is lowered to between 70°C. – 90°C. (160°F. – 190°F.), depending on the kind of jam. The jam is filled into clean containers which are hermetically sealed and given a short heat treatment to ensure that the headspace is free from micro-organisms capable of growing on the jam surface. Partial cooling of the jam and agitation prior to filling are necessary in order to ensure that the solid pieces of fruit and seeds are evenly distributed both as between containers, and also in the jam itself within the container when it has finally set.

Characteristics of Jam

12. Jam is not a staple item of diet and its role is to enhance the palatability of the foods with which it is taken. Because jam is a food adjunct and it is eaten in relatively small quantities at any one time, its nutritive value is of much less importance than its flavour and appearance. The flavour and appearance of jam depend on numerous factors, the most important being the quantity, quality and cultivar* of fruit, the technique used and the care employed in the manufacturing procedure. It is sometimes assumed, however, that the most, or indeed the only, important factor in jam quality is the quantity of fruit used and that the more fruit that is used, the better the jam. This is not necessarily so, because in order to attain the correct composition, which provides sound setting and keeping (microbiological) qualities, a jam must contain about 60% added sugar. Fruit added in excess of the remaining 40% must therefore be concentrated by boiling, with, as previously explained, consequent loss of fresh fruit flavour, over-caramelisation and browning and, in some cases where this would be important, the loss of the whole fruit appearance in the jam. Too little fruit will clearly produce a poor quality jam; too much fruit may also detract from quality. An optimum fruit content therefore theoretically exists; but because many factors, particularly variations in the manufacturing procedure, may affect this figure, it cannot be sharply defined.

13. Jams deteriorate on storage and the degree increases as the ambient temperature increases. As it is unusual to keep jams in cool storage the extent of the change in colour and/or flavour is often quite marked. Preserved fruit will not deteriorate so fast under the same conditions. The advantages in the use of preserved fruit for jam making are not therefore entirely confined to permitting manufacture throughout the year, since jams made from preserved fruit may be superior in flavour to those made several months earlier from fresh fruit and then stored. Although the industry still depends on sulphur dioxide as a means of preserving its major supplies of fruit, increasing use is being made of deep freezing, which has advantages for some fruits. The use of sulphur dioxide as a preservative should therefore gradually be reduced.

The Present Compositional Standards

14. The Food Standards (Preserves) Order, 1953 at present provides for a minimum fruit content of 40%, with a large number of exceptions for specific types of jam. Fruit content is defined as a percentage based on the number of pounds of prepared fruit required to be used in making 100 lb. of finished jam or marmalade. In addition, a minimum soluble solids content is laid down, and there is a limitation on the particular acids which may be added. The permitted acids are citric, malic and tartaric acid. Special provisions for marmalade, fruit curd

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*'Cultivar' is the term now used to denote a cultivated plant variety, i.e. one raised as a seedling or a sport or introduced from the wild and normally maintained uniform, so far as fruits are concerned, by some form of vegetative propagation.

and mincemeat are included. The provisions of the Order are the sort of prescriptions that occur in the standards of most other countries. In some countries, notably the United States of America, the standard is based on the ratio between the fruit and the sugar content of the jam, together with a minimum soluble solids content, and in others, there is an additional provision prescribing a moisture or dry matter content.

The E.E.C. Draft Directive and the Question of Two Standards

15. The European Economic Community has published a draft Directive on Jams and Preserves. This is the farthest advanced of all the Community's commodity directives and we have studied it with care. It has two main differences from the United Kingdom standard. The first of these is the division of jam into two classes, 'confiture' and 'marmelade'. 'Confitures' are jams made from fruit pulp; 'marmelades' are jams made from fruit purée, or from a mixture of fruit pulp and fruit purée. Fruit pulp is defined as 'the edible part of fruit, whole, or cut into pieces, but not reduced to a purée'. Fruit purée is defined as 'fruit pulp finely divided by sieving or other mechanical means'.

16. Secondly, each of these classes is further divided into two categories, namely, 'extra jam' and 'jam'. In most instances the 'extra' category has a 50% fruit content, and the 'ordinary' 35% (the exceptions are blackcurrants, pineapples, bananas, citrus fruit and ginger). 'Confitures' and 'marmelades' both of the 'extra' category and of the ordinary category when containing not more than two fruits, may not use sulphited pulp; the use of sulphited pulp will in any case cease to be permitted seven years after the issue of the Directive—thereafter sulphur dioxide will be prohibited as a preservative in fruit pulp for preserves manufacture. Colouring matter may not be added to the 'extra' categories. The word 'marmelade' is used in a different sense from its current usage in English, and is not confined to citrus preserves. Another major difference between the proposed Directive and the United Kingdom Order is that the prescriptions for jelly jams, which also have two categories, 'extra jelly' and 'jelly', are based on juice content and not on the minimum usage of prepared fruit in the preparation of the jelly.

17. There would clearly be advantages in equating our standard with that proposed by the Community, but there seem to be formidable difficulties. We cannot see what advantages would accrue from a distinction between jam derived from fruit pulp and fruit purée. The idea of two standards differing in fruit content certainly has some attraction, since it would make the distinction between a high and low fruit content easy for the consumer to appreciate. If the higher fruit content level were placed at 50%, it would match the fruit content of jams which are certainly popular in other countries. Such jams might have appreciable sales here if they were clearly distinguished from jams of a lower fruit content. If such a system were adopted, however, it would be necessary to have a marked difference in fruit content between the two types of jam and this could only be achieved by lowering the basic standard for some jams from the present figure. We have no evidence of any substantial demand for two standards in this country and we think it would be a retrograde step to lower the basic standard for any jam without some overriding reason. The industry would also argue forcibly that for many jams a 50% fruit content is beyond the optimum for quality, on the grounds stated in paragraph 12. We consider, therefore, that it would be more satisfactory to retain a single general standard of minimum fruit content. There is, of course, nothing to prevent

manufacturers from producing jams with a higher fruit content and declaring the fact on their labels if, in their view, an improved product can be obtained in this way.

The Standard for Jelly Jams

18. The draft E.E.C. Directive, in common with the standards of several other countries, notably the United States of America, provides for jelly jams a minimum fruit juice content. In some cases, and in particular that of British-type jelly marmalade, the draft Directive sets the juice content so high that the product could not be produced at all for economic and probably also for technical reasons. The present U.K. standard for jelly jams is based—as for jams—on the amount of fruit used in the preparation of the product. While this does not necessarily ensure that the jelly contains a minimum amount of fruit juice—which is why other countries prefer the fruit juice content criterion—it reflects the U.K. view that a jelly jam is a jam from which the insoluble solids have been removed. Moreover, the use of whole fruit can mean that certain of the minor volatiles derived from the insoluble portion are retained in the jelly, and enhance its flavour. We consider that there is no reason to change the present method of treating jams and jellies in the same way, despite the removal of part of the fruit content in jelly jams as insoluble solids in the manufacturing process. We deal more fully with the question of prepared fruit in paragraph 37.

The Use of Sulphited Pulp

19. Manufacturers use fresh fruit and fruit preserved by freezing or canning or by sulphur dioxide ('sulphited pulp'). The effects of sulphiting vary to some extent according to the type of fruit. The most significant effect is the loss of colour particularly in red fruits and blackcurrants although the colour is partly restored when the jam is boiled and the sulphur dioxide is lost. Strawberries also tend to lose their physical structure, raspberry seeds become translucent and less easily seen ('blind') and gooseberries and currants, unless pre-cooked, tend to harden owing to demethoxylation of the pectin. On the other hand, sulphiting tends to protect any ascorbic acid (Vitamin C) in the fruit and largely prevents browning which may arise with other methods of preservation.

20. We have considered whether the use of sulphited pulp should still be allowed. We were told by the jam manufacturers that, with proper care, a first class jam could be produced entirely from fruit preserved with sulphur dioxide. This is particularly true for certain fruits, e.g. plums and gooseberries. Although the use of sulphited pulp is bound in most cases to lower the quality of the jam in comparison with the use of fresh or frozen fruit and should, therefore, gradually be discontinued, it is the only practical way at present to carry out continuous manufacture of jam economically throughout the year. We welcome, however, the trend to reduce the usage of sulphited pulp referred to in paragraph 13. As it will be necessary in future for the ingredients of jams to be declared, the presence of sulphur dioxide and of added colour, which is essential when sulphited fruit is used, will have to be declared. We *recommend*, therefore, that there should be no restriction on the use of any suitable fruit whether raw or preserved.

Fruit Content

21. While fruit content is not the sole determinant of the quality of jam, it is a very important one. If, however, fruit content is increased much beyond 40% there are two opposing tendencies operating. The fruit in excess of 40% contributes to the fruit flavour and colour, as well as increasing the available

pectin, but, for the reasons given in paragraph 12, adverse changes to both flavour and colour also begin to occur. In general, no sharply defined optimum fruit content is detectable but rather a range of fruit contents varying with the particular fruit and also with the precise manufacturing process. For some fruits (e.g. blackcurrant) there may even be reasons, such as the high pectin content or strong flavour, which make a 40% fruit content undesirably high. The problem of determining the optimum for any jam is complicated by the variability of the fruit used and by the fact that consumer preference is based on several subjective criteria, especially flavour and appearance, which are evaluated differently by different consumers.

22. It was suggested to us by the jam manufacturers that the long term standards in the table (page 6) were to some extent out-dated because improved methods of production had led to jams of higher quality being produced without an increase in fruit content. Certain of these changes in manufacture would allow the use of a higher fruit content without excessive caramelisation, so minimising the argument against the use of a high fruit content. We think that, taking into account all factors involved, the general line taken in our 1952 Report was the right one and that, while we do not think there is sufficient justification to increase the basic minimum fruit content above 40%, we consider that it would be reasonable to reduce the number of exceptions considerably by raising the fruit content of a number of jams. This would produce a definite improvement in quality without causing any serious difficulties for the manufacturers. We *recommend*, therefore, that the general minimum fruit content of jams should be 40%.

23. Some exceptions will, of course, be required and we *recommend* as follows:

(i) *Blackcurrant jam*

This fruit has a high pectin content which would result in a very stiff jam if the fruit content were set too high. We therefore *recommend* that blackcurrant jam should have a minimum fruit content of 30%.

(ii) *Raspberry jam and jams of which raspberry is the major fruit ingredient*

The present minimum fruit content is 30%, and to raise this to 40% would involve an additional usage of one-third the present fruit content. In the absence of any clear evidence that a 40% fruit content gives a markedly superior jam to one with a 35% fruit content we consider that so large an increase in one step would be unreasonable. We therefore *recommend* that the minimum fruit content for raspberry jam and jams of which raspberry is the major fruit ingredient should be 35%. The same figure should apply to loganberry jam.

(iii) *Redcurrant jelly*

As the table on page 6 shows, the figure for the fruit content for redcurrant jelly has remained constant at 35% from pre-war. We see no reason to increase it. We therefore *recommend* that the minimum fruit content for redcurrant jelly should be 35%.

We consider that the provisions as to two-fruit jams in the present Order—that the first named fruit should amount to not less than 50% and not more than 75% of the fruit content—and that the special provisions for jams containing lemon, pineapple and ginger as minor ingredients should be retained.

Marmalade

24. The present standard for marmalade is 20% minimum fruit content; there are special provisions for ginger marmalade. The numerous varieties of British

marmalade are made with different proportions of peel and vary in appearance and texture from an almost clear jelly to thick cut peel and jelly. We considered whether the standards should distinguish marmalades from jelly marmalade and whether the minimum of 20% which at present applies to both should be increased. In view, however, of the very wide range of products being made and of their general acceptance by consumers we do not consider that any changes need to be made. We deal with the question of nomenclature of marmalade including 'orange marmalade' in paragraph 57.

Speciality Jams and Jellies
25. We have received representations about the fruit content of jams and jellies made from cranberries, bilberries and rowans. These products are only made in small quantities and for special uses and the fruit vary according to season and locality with a tendency for some to be bitter in taste. The manufacturers suggested that the optimum fruit content for fruit from some sources would not be much above 25%. At present these jams are included in the 40% fruit content standard which on this evidence may sometimes be too high. We agree that these representations are reasonable and *recommend* that the minimum fruit content for cranberry, bilberry and rowan jam and jelly be fixed at 30%.

26. **Summary of Recommendations for the Minimum Fruit Content of Particular Jams**

Minimum Fruit Content in lb. per 100 lb. of Jam and Marmalade

Fruit	1953 *Order*	*Present recommendations*	*Increase + or decrease —*
Bilberry	40	30	—10
Blackcurrant	25	30	+5
Bramble	38	40	+2
Cranberry	40	30	—10
Damson	35	40	+5
Fig and Lemon	40(8)*	40(8)*	NIL
Gooseberry	30	40	+10
Gooseberry and Raspberry	30	40	+10
Gooseberry and Strawberry	30	40	+10
Greengage	38	40	+2
Loganberry	30	35	+5
Melon and Lemon	40(8)*	40(8)*	NIL
Melon and Pineapple	40(5)*	40(5)*	NIL
Melon and Ginger	40(1)*	40(1)*	NIL
Raspberry	30	35	+5
Raspberry and Gooseberry	30	35	+5
Raspberry and Loganberry	30	35	+5
Raspberry and Redcurrant	30	35	+5
Redcurrant	35	35	NIL
Rhubarb and Ginger	40(1)*	40(1)*	NIL
Rowan	40	30	—10
Strawberry	38	40	+2
Strawberry and Gooseberry	35	40	+5
Youngberry	38	40	+2
All other varieties	40	40	NIL
Marmalade	20	20	NIL
Ginger Marmalade	25 drained ginger or 25 ginger and citrus with not less than 15 drained ginger.	25 drained ginger or 25 ginger and citrus with not less than 15 drained ginger.	NIL

*Figures in brackets denote the proportion of the second named fruit.

Definitions

27. The present Order does not contain definitions of jam or marmalade. We consider that it is essential to define these products and we *recommend* the following:

(i) '*Jam*' means the product obtained by processing fruit, fruit pulp or purée, to a suitable consistency by the application of heat, with water and a carbohydrate sweetener. It may contain added pectin and permitted acids together with other minor ingredients.

(ii) '*Jelly*' means jam from which the insoluble solids have been removed during the process of manufacture.

(iii) '*Marmalade*' means the product obtained by processing citrus fruit, fruit pulp or purée, to a suitable consistency by the application of heat, with water and a carbohydrate sweetener. It may contain added pectin and permitted acids together with other minor ingredients.

(iv) '*Jelly marmalade*' means marmalade from which either all the insoluble solids or all the insoluble solids except for a small proportion of thinly cut peel have been removed during the process of manufacture.

Soluble Solids Content and Permitted Sugars

28. A minimum soluble solids content has always been considered necessary in order to ensure that the jam has the right consistence and that it will keep for a reasonable period after opening. Consistence and sweetness can be varied and crystallisation prevented, within limits, by the choice of sugar.

Although the sugar most used is sucrose, glucose syrup and invert sugar are often included in jams. A high proportion of glucose syrup might have some adverse effect on the keeping quality but we consider that control on this point may be safely left to the manufacturers. We *recommend* that the permitted sugars should be limited to sucrose, dextrose, glucose syrup, dried glucose syrup, invert sugar and honey, without any specification of maximum amounts or of relative proportions.

29. The present Order stipulates a minimum of 68½% or 65% soluble solids. We considered representations that melon jam should be allowed to contain 60% minimum soluble solids because a smaller proportion of sugar than 65% might well enhance the fruit flavour of the jam. The keeping qualities of such a jam would, after opening, be inferior to that of other jams sold in the United Kingdom. In these circumstances, we think that this would be detrimental to the purchaser and that we should not therefore provide specially for melon jams. We *recommend* accordingly.

30. We also considered representations that a lower soluble solids content together with the use of suitable preservative, such as sodium benzoate, could well result in a jam with better flavour since less heat treatment would be necessary and more fruit could be used. We consider that jams are properly regarded as being mixtures of fruit and sugar and that the sweetening qualities of sugar should not be replaced by an artificial sweetener nor should its preserving action be replaced by a permitted preservative. We *recommend* that the soluble solids content should remain at the levels of the present Order, i.e. 68½% or 65% in a hermetically sealed container. We received representations that the present definition of hermetically sealed containers is too restrictive. It does not provide for the use of new materials which, whilst fully adequate to act as a barrier to spoilage micro-organisms, cannot maintain a vacuum, as air

can diffuse through them. We accept these representations and *recommend* that the prescription should refer to 'sealed' not to 'hermetically sealed' containers. '*Sealed container*' should be defined as 'a container sealed in a manner so as to preclude the entry of micro-organisms'.

Fruit Residues

31. Our attention has been drawn to the fact that it would be possible to add to a jam residues of fruit resulting from the production of other jams or even of other fruit products. This would be thoroughly undesirable and we *recommend* that the use of such fruit residues should be specifically prohibited.

Definition of Fruit Content and Prepared Fruit

32. As already mentioned, the present standards lay down the minimum fruit content based on the amount of fruit used in the preparation of the jam, i.e. on the amount of 'prepared fruit' which is defined for most fruit as 'sound fresh fruit from which stalks and calices have been removed'. This rule means that a manufacturer may make 100 lb. of jam from 40 parts by weight of prepared fruit. He must of course ensure that the jam has the minimum soluble solids content and this determines the amount of sugar used which may be adjusted for, amongst other things, the variations in soluble solids of the fruit itself. It also means that the jam will in fact contain all the non-volatile constituents corresponding to 40% fruit unless the manufacturer has removed stones (e.g. in damsons) or pips (e.g. in raspberries) or other insoluble solids such as a proportion of the skin in order to improve the texture of the final product.

33. We received representations that the fruit content should be expressed on the final product and not on the amount of fruit used. We were also asked to consider the exclusion of stones from the definition of prepared fruit. In both cases the representations drew attention to the difficulties experienced in enforcing the standard in respect of fruit content because of the terms of the present Order. We were told that the minimum standard for soluble solids could be readily enforced since it was expressed on the final product and because the analyst could check it easily and accurately. In addition it was pointed out that to express the standard for fruit content in terms of the final product would make the offence clearer and would require the manufacturer, in cases of doubt, to satisfy the enforcement authorities and the courts that he had complied with the standard, rather than, as at present, the enforcement authorities having to show that he did not use a particular quantity of prepared fruit. This is always difficult and impossible in the case of imports.

34. The analysis of jam for fruit content, however expressed, is bound to be a difficult task. The usual method relies in the first instance on the determination of the insoluble solids; the figure obtained is converted into the estimated percentage of fruit in the jam using average figures for insoluble solids for the particular fruit. The actual insoluble solids content of the batch of fruit used in the jam may however differ very appreciably from the average. The variations depend in part on the cultivar but they also occur from season to season and because of climate and other geographical conditions. Some idea of these variations can be gained from the table given in Appendix III. The analyst can also measure the characteristic soluble constituents of the jam such as potassium and phosphorus but these are also subject to wide variations for a given fruit and may not in any case originate uniquely from the fruit in the jam.

35. So even in a straightforward case there could be a fairly wide margin in the estimated fruit content as determined by the analyst. If insoluble solids such as stones, pips and skins are removed, the potential difficulties for the analyst are increased. We were told by the manufacturers that these insoluble solids were sieved out of the jam at various stages of the production and that if the definition of prepared fruit were changed this would create serious production difficulties. Stones account for only a small proportion of the whole, prepared fruit; typical average values are plums 4%, greengages 5%, apricots 6%, cherries 7% and damsons 8% by weight. The removal of stones need not, in our view, cause difficulty for the analyst who can base his opinion on values for insoluble solids for fruits from which the stones have been removed. However, the removal by the manufacturer of a proportion of the skin or (in the case of raspberries) of the pips does make it more difficult to form an opinion on the fruit content of jams such as raspberry, apricot, damson, greengage and plum. In some cases a substantial proportion of the insoluble solids will be removed. Since these practices have as their objective the improvement of the jam, we do not consider that there is any reason to regard them as undesirable.

36. If the fruit content were expressed on the final product, the manufacturer would have to alter his production process so as to ensure that the final fruit content of his jam complied with the standard for all variants in his raw materials. At present the manufacturer knows exactly where he stands and he need not worry unduly about the variation in insoluble solids (or for that matter soluble solids) in the particular batch of fruit; the production process is geared to the production of 100 lb. of jam at or above the minimum soluble solids content from an amount of fruit equal to or exceeding the prescribed figure. The jam as sold to the consumer will contain the required content of fruit less those parts of the fruit like stones which, having perhaps contributed to the flavour, have been removed in order to improve the texture and appearance of the jam.

37. Unless the present method of specifying fruit content is retained, the whole basis of defining the fruit content of jelly jams would have to be altered, presumably on the basis of fruit juice content. Despite the marginal advantage of this to the analyst, unless as in the United States regulations arbitrary figures are used to convert an analytical determination into a value for juice content, it would not seem necessary to introduce a separate system for products which form only a minor proportion of the whole market. It would seem preferable to retain the present system which at least makes it clear to the manufacturer how he can comply with the regulations in carrying out his process.

38. We recognise the difficulties for the enforcement authorities and for the analyst under the present system. The natural variations of fruit are a significant factor under any system, however, and on balance we consider that it would be generally to the detriment of the manufacturer and not significantly to the advantage of the consumer if the existing method was to be changed. We *recommend*, therefore, that the definition of fruit content and of prepared fruit be left unchanged.

Permitted Ingredients

39. In addition to the provisions for a minimum soluble solids content (which effectively ensures that a minimum proportion of sugar is present) and a minimum fruit content, the present Order includes a restriction on the use of acids to three specific substances. The only other control over ingredients is the provision of a maximum of 100 p.p.m. sulphur dioxide in the Preservatives in

Food Regulations, 1962. We consider that it is desirable to lay down in some detail what jams and marmalades may contain so long as this can be done without undue restriction on the freedom of manufacturers to take advantage of future developments. We think this can be done and deal with the ingredients other than sugar and fruit in the next following paragraphs.

Acids

40. The addition of lactic acid to the list of permitted acids was one of the points we were specifically asked to consider. This acid is natural to some foods and is technologically useful because it may help to achieve clarity and brightness in the jelly. Because it has a relatively bland flavour more of it can be used to adjust the acidity without adversely affecting the flavour of the jams. We *recommend* that the use of lactic acid should be permitted. Representations were also made that the use of fumaric acid should be permitted. Until recently the question of using this acid did not arise because of its very high cost. Although fumaric acid occurs naturally in some fruits, this is equally true of many other acids and we do not consider that with the other permitted acids available, it need be included in the list of permitted acids in the revised regulations. We consider that the sodium, potassium and calcium salts of the permitted acids, together with sodium hydroxide and sodium bicarbonate, which may be required to correct excessive acidity, should be permitted. We *recommend* accordingly.

Pectin

42. Where there is insufficient pectin in the fruit to obtain a firm set it is necessary to add pectin. We *recommend* that pectin should be permitted to be added without statutory limitation to make up for a natural deficiency.

Colours

43. Colouring matter may not be added to 'extra' jams under the E.E.C. draft Directive, but, as already mentioned in paragraph 19 the use of colour is necessary for sulphited pulp as the sulphur dioxide reduces the colour contributed by the fruit to the jam. Certain manufacturers add colour in order to achieve an attractive and consistent appearance in jam, even when sulphited pulp is not used. Some fruits, as, for example, the strawberry 'Cambridge Favourite' give satisfactory jam except for colour, and an attractive jam can be produced only if colour is added. We see no reason to restrict the use of permitted colouring matter, and we *recommend* accordingly.

Flavouring Agents

44. We understand that there is little use of flavourings in jams, though they are occasionally used in jams containing two or more fruits, normally to enhance the flavour of one component. We consider that the flavour of a jam ought to be derived from the fruit, and therefore that the addition of flavourings designed to simulate the natural flavour should not be permitted. We do not, however, see any objection to the use of spices such as cloves or cinnamon, or to spirituous liquors, or natural essential oils in marmalades. We *recommend* accordingly.

Preservatives

45. We have already said that jams should be preserved by using the right amount of sugars, so that the addition of preservatives to jam should not be permitted. So long as sulphited pulp is used, however, it will be necessary to allow for unavoidable residues of sulphur dioxide in the jam and to continue

the provisions for jam to be permitted to contain up to 100 p.p.m. as is already provided for in the Preservatives in Food Regulations, 1962.

Anti-foaming Agents

46. Foaming is a considerable problem with some jams during manufacture, and the use of an anti-foaming agent is essential. Small quantities of edible oils and fats are often effective and are widely used. In addition, we understand that small quantities of certain other anti-foaming agents are currently used. We consider that the use of anti-foaming agents, whether edible oils and fats or the appropriate synthetic product, is necessary in the manufacture of jam, and we *recommend* that their continued use should be permitted. A permitted list of anti-foaming agents has been recommended by the Food Additives and Contaminants Committee in their Report on Further Classes of Additives.

Bakery Jams

47. Preserves are widely used in the baking industry. The present Order applies to all jams whether sold by retail or wholesale and there is no doubt that the consumer expects to get jam which complies with the standard in, for example, 'jam tarts'. Where the product is to be baked with the jam in it, it is desirable for the jam to be of a composition which will not boil out and which will set satisfactorily after cooking. This may require a small reduction of the soluble solids content which is achieved in some cases by the addition of a little water to the jam before the product is cooked. In some cases too, the consistence of the jam must be specially adjusted. These modifications can be carried out by the baker provided he is sure that the loss of water in baking will equal or exceed any addition he has made.

48. We have considered whether jams sold for bakery, manufacturing or catering purposes should be exempted wholly or partly from the standards. We do not think that any technological disadvantages for the baker or other user that may arise from employing 'standard' jams are sufficient to outweigh the clear advantage, particularly to the consumer, from there being no exemptions. We *recommend*, therefore, that (except as indicated in paragraph 55 below) the standard should, as now, apply to all jams intended for sale by wholesale or retail.

Fruit Curd

49. We have considered the provisions of the present Order in relation to fruit curds, and, in particular, whether it is still necessary to require all curds to contain either oil of lemon or oil of orange irrespective of the flavour of the curd. There is the additional question of whether the minimum amounts of these oils as specified in the existing Order should still be required for lemon or orange curd respectively. Because of technical developments since 1953, we are satisfied that the incorporation of lemon or orange oil is not necessarily a measure of the quality or the value of the product to the consumer. These oils are used solely as flavouring agents and we do not think, therefore, that any special provisions are necessary for them. We *recommend*, therefore, that no similar provision should be included in any new regulations.

50. We *recommend* that the remaining provisions in relation to fruit curd should be left unaltered except that the definition of egg content should be based on the more usual method of 'egg yolk solids'. We therefore *recommend* that the provision relating to this should be expressed as '0·7% of egg yolk solids'. This is a very close equivalent to the egg contents specified in the present Order.

51. We also considered whether there should be a distinction between a product described as 'cheese' and one described as 'curd'. Some manufacturers restrict the description 'cheese' to products made entirely from fresh eggs, butter, fruit juice and sugar. Our enquiries suggest that traditionally these terms have been used as synonyms, the distinction being largely regional. 'Curd' is the common word in the south of England and 'cheese' in the north. We do not consider it would be right, therefore, to lay down any special provisions to distinguish a 'cheese' from a 'curd.'

52. We have already dealt, in our Report on Claims and Misleading Descriptions, with the nomenclature of foodstuffs where the flavour is not wholly derived from a natural product indicated by the name of the food. We would therefore expect that curds which are made other than from fruit or fruit juice to be labelled as ''X' flavour curd' and we *recommend* accordingly.

53. We *recommend* the following definitions of 'fruit curd' and 'fruit-flavour curd':

(i) '*Fruit Curd*' means any smooth, thick, stable emulsion of edible fat or oil, sugar, whole egg or egg yolk, fruit, fruit pulp, fruit purée or fruit juice, with or without added citric acid, water, edible starch or flour, salt, essential oils and other minor ingredients, and the expression includes fruit cheese but does not include salad cream, ice-cream and imitation cream.

(ii) '*Fruit-Flavour Curd*' means a curd conforming to the definition of a fruit curd except that it may or may not contain fruit, fruit pulp, fruit purée or fruit juice and in which part or all of the fruit flavour is derived from substances other than fruit, fruit pulp, fruit purée or fruit juice.

Mincemeat

54. Mincemeat differs from the other preserves in the optional use of a large number of ingredients and we do not therefore consider a definition is necessary or desirable. We considered representations on the present standard and we propose that four small changes should be made. The provision for acetic acid content should be expressed as 'acetic acid'. It should be made clear that the provision relating to dried fruit and peel means dried vine fruit and citrus peel respectively, which is the usual interpretation. The definition of suet should be expressed as 'suet or other fat or compound fat to give not less than 2·5% fat content in the mincemeat'. The provision for added sugar should be dropped in view of the provision of a minimum soluble solids content. We *recommend* accordingly.

Diabetic Jams and the Use of Artificial Sweeteners

55. The present Order does not apply to jam or marmalade prepared for consumption by diabetics and labelled to that effect. We *recommend* that this exemption should be maintained. We received representations that artificial sweeteners should be allowed in other jams prepared as dietary or slimming products in which sugar was partially replaced by an artificial sweetener. Although the provision of a soluble solids content for preserves subject to the standards will prevent the substitution of sugar by artificial sweeteners, we do not think it right that artificial sweeteners should be used except in diabetic jams. We *recommend*, therefore, that there should be explicit provision to the effect that artificial sweeteners should not be allowed in preserves covered by the standard.

Labelling

56. When the Labelling of Food Regulations, 1967 come into force, jams and preserves will no longer be exempted from the requirements to declare their ingredients; this will, of course, ensure that the presence of added colour and preservative is made clear to the consumer. We have considered whether there is any need to lay down any special provisions. It has been suggested that declarations of the kind of raw material, e.g. 'made from fresh fruit', 'made from fruit pulp', should be imposed. As we have already pointed out, the type of raw material is only one of the many factors that affect the quality of the jam, and we do not think that it would be an advantage to the consumer to make such declarations compulsory. There is, of course, nothing to prevent the manufacturer from making true claims for his product.

57. We have considered whether there should be any new provisions about nomenclature. An appropriate designation will of course be required by the Labelling of Food Regulations, 1967. The present position is described in paragraph 5 and we see no need to lay down any specific provisions. We should, however, like to make it clear that we would expect marmalade products described as 'marmalade' or 'orange marmalade' to be made wholly from oranges or with the addition of a small proportion (e.g. less than 10%) of other citrus fruits. We consider it sufficient in these cases for the fruit(s) to be listed in the declaration of ingredients and that the name need not include the names of the other citrus fruits.

Summary of Recommendations

58. (1) The basic minimum fruit content for jam should remain at 40%. (Paragraph 22)

(2) The number of exceptions should be reduced by raising the fruit content of a number of jams. (Paragraph 22)

(3) The main exceptions to be allowed in future should be blackcurrant jam (30%), raspberry jam and jams of which raspberry is the major fruit ingredient (35%), loganberry jam (35%), redcurrant jelly (35%). (Paragraph 23)

(4) For two-fruit jams, the first named fruit should amount to not less than 50% and not more than 75% of the fruit content and the existing special provisions for certain jams should be retained. (Paragraph 23)

(5) The minimum fruit content for cranberry, bilberry and rowan jam or jelly should be 30%. (Paragraph 25)

(6) Definitions of jam, jelly, marmalade and jelly marmalade, should be laid down. (Paragraph 27)

(7) The permitted sugars should be limited to sucrose, dextrose, glucose syrup, dried glucose syrup, invert sugar and honey without any specification of maximum amounts or of relative proportions. (Paragraph 28)

(8) No reduction in the minimum soluble solids figure should be allowed for melon jam. (Paragraph 29)

(9) The soluble solids content should remain at the present levels, i.e. 68½% or 65%. The figure of 65% should apply to jam in a 'sealed container'. (Paragraph 30)

(10) There should be a specific prohibition of the use of residues of fruit resulting from the production of other jams or of other fruit products. (Paragraph 31)

(11) The definitions of 'fruit content' and 'prepared fruit' should not be changed. (Paragraph 38)

(12) Lactic acid should be added to the list of permitted acids (paragraph 40) but fumaric acid should not. (Paragraph 41)

(13) The sodium, potassium and calcium salts of the permitted acids and sodium hydroxide and sodium bicarbonate should be permitted. (Paragraph 41)

(14) Pectin should be permitted without limitation to make up for a natural deficiency. (Paragraph 42)

(15) There is no reason to restrict the use of permitted colouring matter. (Paragraph 43)

(16) Flavourings designed to simulate the natural flavour should not be permitted. There is no objection to the use of spices such as cloves or cinnamon or spirituous liquors or natural essential oils in marmalades. (Paragraph 44)

(17) Provision should continue to be made for allowing up to 100 p.p.m. of sulphur dioxide in the jam but for no other preservative. (Paragraph 45)

(18) Anti-foaming agents, whether edible oils or fats or the appropriate synthetic product, should be permitted. (Paragraph 46)

(19) The standard should apply to all jams intended for sale by wholesale or retail; there should be no exemptions for 'bakery jams' or jams sold to caterers or manufacturers. (Paragraph 48)

Curds

(20) Special provisions are not now required for curds to contain added oil of lemon or oil of orange. (Paragraph 49)

(21) The provision relating to egg content should be expressed as '0·7% of egg yolk solids'. (Paragraph 50)

(22) Curds made other than from fruit or fruit juice should be labelled as ''X' flavour curd'. (Paragraph 52)

(23) Definitions of fruit curd and fruit-flavour curd should be laid down. (Paragraph 53)

Mincemeat

(24) In the standard for mincemeat, four small changes should be made; the definitions of acetic acid, dried fruit and peel and suet should be changed and the provision for added sugar should be omitted. (Paragraph 54)

Diabetic Jams and the Use of Artificial Sweeteners

(25) The exemption for jam or marmalade prepared for consumption by diabetics and labelled to that effect should be continued. (Paragraph 55)

(26) Artificial sweeteners should not be allowed except in jams or marmalade which are exempt from the standard. (Paragraph 55)

FSC/REP/53 July 1968

LIST OF ORGANISATIONS FROM WHOM EVIDENCE HAS BEEN RECEIVED

Association of Municipal Corporations.
Association of Public Analysts.
Association of Sea and Air Port Health Authorities.
Berkshire County Council.
Bowmans Chemicals Limited.
British Diabetic Association.
British Food Manufacturing Industries Research Association.
Co-operative Wholesale Society Limited.
Consumers' Association.
Consumer Council.
County Councils' Association.
Edgar J. Saxon Limited.
Flour Milling and Baking Research Association.
*Food Manufacturers' Federation.
Government of the Republic of South Africa.
Institute of Weights and Measures Administration.
Joint Consultative Council of the Fruit, Vegetables and Flower Industries.
Laporte Industries Limited.
Marks and Spencer Limited.
National Farmers' Union of Scotland.
Nottinghamshire County Council.
Parliamentary Committee, Co-operative Union Limited.
Supermarket Association.

*Gave oral evidence.

THE FOOD STANDARDS (PRESERVES) ORDER, 1953
(Statutory Instrument 1953, No. 691, as Amended by Statutory Instrument 1953, No. 1307).

This appendix should not be regarded as a legal instrument.

The Minister of Food, in pursuance of the powers conferred upon him by Regulation 2 of the Defence (Sale of Food) Regulations, 1943 (a) as continued in force by the Emergency Laws (Continuance) Order, 1952 (b), and of all other powers him enabling in that behalf, hereby orders as follows:

1. This Order may be cited as the Food Standards (Preserves) Order, 1953, shall be construed as one with the Food Standards (General Provisions) Order, 1944 (c) as amended (d), and shall come into operation on the 1st day of September, 1953.

2. In this Order—

'Sale by retail' means any sale to a person buying otherwise than for the purpose of resale and includes a sale to a caterer for the purposes of his catering business but does not include a sale to a manufacturer for the purposes of his manufacturing business.

'Sale by wholesale' means in relation to jam, marmalade, fruit curd (including fruit flavour curd) and mincemeat any sale other than a sale by the manufacturer thereof and other than a sale by retail.

3.—(1) Pursuant to Regulation 2 of the Defence (Sale of Food) Regulations, 1943, the Minister of Food hereby prescribes that the standards for jam, marmalade, fruit curd (including fruit flavour curd) and mincemeat shall be as specified in the Schedule to this Order.

(2) Nothing in this Order shall apply as respects any jam or marmalade specially prepared for consumption by diabetics and sold, offered or exposed for sale in a container clearly and conspicuously labelled to that effect.

4. Proceedings in England and Northern Ireland for an infringement of Article 1 of the Food Standards (General Provisions) Order, 1944, as amended, in respect of jam, marmalade, fruit curd (including fruit flavour curd) or mincemeat may be brought by a Food and Drugs Authority without the consent of the Minister of Food.

5. Save as hereinafter provided, the Food Standards (Preserves) Order, 1944 (e) as amended (f), and the Food Standards (Preserves) (Amendment) (Commencement) Order, 1950 (g), are hereby revoked but without prejudice to any proceedings in respect of any contravention of the Food Standards (General Provisions) Order, 1944, as amended, construed as one with the said Food Standards (Preserves) Order, 1944, as amended.

G. Lloyd-George,
Minister of Food.

Dated the 22nd day of April, 1953.

(a) S.R. & O. 1943/1553; 1945/1454; 1943 II, p. 70; 1945 II, p. 95.
(b) S.I. 1952/2095.
(c) S.R. & O. 1944/42; 1944 II, p. 505.
(d) S. R. & O. 1944/654; 1944 II, p. 508.
(e) S. R. & O. 1944/842; 1944 II, p. 513.
(f) S. R. & O. 1946/157, 1221; 1946 II, pp. 26, 25; S.I. 1949/1893; 1950/1056; 1949 II, p. 9; 1950 III, p. 38.
(g) S. I. 1950/1871; 1950 III, p. 40.

1. For the purposes of this Schedule—

(a) 'fruit' includes ginger, rhubarb and marrow;

(b) 'fruit content' means as respects any jam or marmalade the total quantity of fruit of the variety or varieties used in the manufacture of the jam or marmalade, being, where such variety or varieties are specified in the description thereof on sale, offer or exposure for sale, the total quantity of the variety or varieties so specified. The said quantity is the total quantity of the prepared fruit used in the manufacture of the jam or marmalade or in the case where fruit pulp is used the total quantity of the prepared fruit used in the manufacture of the pulp (no account being taken in any case of any added fruit juice or added pectin not derived from the prepared fruit) expressed as a percentage based on the number of pounds of prepared fruit required to be used in making 100 lb. of finished jam or marmalade;

(c) 'hermetically sealed container' means a container sealed while the contents are hot with a closure capable of maintaining the partial vacuum resulting from cooling;

(d) 'jam' includes jelly jam;

(e) 'marmalade' includes jelly marmalade;

(f) 'prepared fruit'—

(i) as respects ginger, rhubarb, melon and marrow means respectively peeled ginger root or stem, trimmed rhubarb, and melon and marrow without seeds, stem or rind;

(ii) in all other respects means sound fresh fruit from which stalks and calices have been removed;

(g) 'percentage of soluble solids' means as respects any product the percentage by weight of soluble solids ascertained, when the product is at a temperature of 20°C., by means of a refractometer, no correction being made for insoluble solids.

2. **Standard for Jam**

(1) Jam shall contain a percentage of soluble solids of not less than 68½% unless packed in hermetically sealed containers when it shall contain not less than 65%.

(2) The fruit content of jam shall be not less than as specified in the table overleaf.

MINIMUM FRUIT CONTENT

Description of Jam	*Fruit content*
	%
Blackberry or Bramble	38
Blackcurrant	25
Damson	35
Gooseberry	30
Gooseberry and Raspberry	30
Gooseberry and Strawberry	30
Greengage	38
Loganberry	30
Melon and Lemon	40 (8)
Melon and Pineapple	40 (5)
Melon and Ginger	40 (1)
Raspberry	30
Raspberry and Gooseberry	30
Raspberry and Loganberry	30
Raspberry and Redcurrant	30
Redcurrant	35
Strawberry	38
Strawberry and Gooseberry	35
Youngberry	38
All other varieties	40
Fig and Lemon	40 (8)
Rhubarb and Ginger	40 (1)

(3) Except as provided in paragraph (4) below the first named fruit in all mixed jams shall amount to not less than 50% and not more than 75% of the fruit content.

(4) Where figures appear in brackets in the second column of the table above the figure in each case denotes the minimum quantity by weight of the second named fruit to be contained in the finished jam expressed as a percentage based upon the number of parts by weight of the second named fruit required to be present in 100 parts by weight of finished jam.

3. Standard for Marmalade

Marmalade shall contain a percentage of soluble solids of not less than 68½% unless packed in hermetically sealed containers when it shall contain not less than 65%, and—

(a) in the case of marmalade other than ginger marmalade the fruit content shall be not less than 20% citrus fruit;

(b) in the case of ginger marmalade the fruit content shall be not less than 25% drained ginger only or 25% drained ginger and citrus fruit but so that not less than 15% shall be drained ginger. 'Drained ginger' means ginger (in syrup) drained free from syrup.

4. General

No jam or marmalade shall contain any added acid other than citric, tartaric or malic acid.

5. Standard for Fruit Curd (Including Fruit Flavour Curd)

(1) Each 100 parts of fruit curd shall contain not less than—

- (a) 4 parts of fat,
- (b) 0·33 part of citric acid,
- (c) 0·125 part of oil of lemon (or 0·25 part of oil of orange),
- (d) 1 part of dried whole egg
  or 1½ parts of sugar dried whole egg
  or 3¾ parts of liquid or frozen whole egg
  or 4½ parts of shell egg.

(2) The percentage of soluble solids contained in fruit curd shall be not less than 65%.

6. Standard for Mincemeat

(1) Each 100 parts of mincemeat shall contain—

- (a) not more than 0·5 part of acetic acid (80 % or glacial),
- (b) not less than 30 parts of added sugar,
- (c) not less than 30 parts of dried fruit and peel,
- (d) not less than 2·5 parts of suet or equivalent fat.

(2) The percentage of soluble solids contained in mincemeat shall be not less than 65%.

APPENDIX III

INFORMATION ON THE INSOLUBLE SOLIDS CONTENT OF FRUIT

Basic data for the normal variation of parameters which have been used for the estimation, following analysis, of the fruit content of preserves such as insoluble solids, are contained in three papers published by Money and colleagues in *J. Sci. Food Agric.* These are 1950, **1**, 3: 1958, **9**, 18: 1964, **15**, 594.The first of these is the main paper and sets out analyses for different fruit varieties. Several analytical parameters are presented, including insoluble solids: these were collected over the years 1925–1950 and the 1958 paper makes the point that further measurements between 1950 and 1958 reveal no significant changes in the values which can therefore be taken to relate to the 30-odd year period 1925–1958. A selection of the insoluble solids values given, some 50 analyses for which are available for most fruits, are as follows:

Fruit	*No. of Samples* (*a*)	*Maximum* %	*Minimum* %	*Mean* %
Apricots (*b*)	43	2·49	1·17	1·60
Blackberries	49	15·31	1·08	(8·0)
Cherries	47	3·92	1·01	(1·6)
Blackcurrants	49	9·72	3·28	5·92
Redcurrants	22	7·86	3·99	5·87
Damsons	18	2·45	1·46	1·91
Gooseberries	67	4·38	1·51	2·21
Greengages	44	1·99	1·14	1·45
Oranges, bitter (*b*)	13	1·26	0·55	0·86
Plums	148	2·26	0·66	(1·4)
Raspberries	271	7·93	1·40	5·12
Strawberries	337	3·40	0·86	2·41

(*a*) 1925–1950

(*b*) edible portion

It will be seen that there can often be a two-fold difference between maximum and minimum; and a much greater difference may occur at times. The figures also include flesh to stone ratios, which also vary; for apricots, for example, the maximum is 21·3 to 1, the minimum 1·2 to 1 and the average 11·0 to 1.

The 1964 paper is concerned in particular with phosphorus and potassium levels and the following quotation from the text illustrates a point made earlier in the Report:

> 'The variations of the potassium and phosphorus contents of any particular fruit are of similar order to those of the attributes normally used as the basis for the calculation of fruit contents (viz., total solids, insoluble solids, non-sugar solids, etc.), and it would therefore appear that potassium and phosphorus values should enable equally reliable estimations to be made. Caution must be exercised, however, in the use of these criteria because of the possible content of potassium and phosphorus in other ingredients used in manufactured products.'

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